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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/081,385	02/20/2002	Takenori Hirose	16869P-042900US	9702

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EXAMINER

LEE, HWA S

ART UNIT PAPER NUMBER

2877

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/081,385

Applicant(s)

HIROSE ET AL.

Examiner

Andrew Hwa S. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37-64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 37-64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remarks

This Office Action is in response to Applicant's amendment of 1/5/05. Claims 1-26 have been cancelled and new claims 37-64 have been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claim 40 recites the limitation "said pattern" in the third line. There is insufficient antecedent basis for this limitation in the claim.
2. Claims 44-47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.. It is unclear what is being referred to with respect to "an interference component" and it is not clear how an interference component can be compare to light. The specification discusses how an interference component produced from the light reflected by the pattern is compared to the interference component produced from the light reflected by the lower layer. In addition, claim 44 recite the "thickness of a thin film" but also recites an "optically transparent film" and it is unclear if the thin film is the same element as the optically transparent film.
3. Claims 37, 47-53, and 59 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. The recitation of what a “surface ratio” is, is not clearly set forth since a ratio is comparison and no comparison defined in the claims.

4. Claims 42 and 54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation of what a “regional model” is, is not clearly set forth in the claims nor clearly defined in the specification.

Double Patenting

5. Claim 39 rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 2 of U.S. Patent No. 6,753,972. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims are essentially reworded with no patentable distinction can be found.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claim 37-46 and 54-64 is rejected under 35 U.S.C. 102(e) as being anticipated by Hirose et al (US 6,753,972).

Hirose et al show the measurement of an optically transparent film comprising:

irradiating light onto a sample on which a plurality of layers of films are formed and having a surface overlaid by an optically transparent thin film;

detecting light reflected from the sample in response to irradiation of the sample; and
determining the thickness of the optically transparent thin film using spectral waveform data from the detected reflected light and wherein the thickness of the optically transparent thin film is determined using waveform information calculated by using models having a plurality of layer structures.

wherein, in the step of determining the thickness of said optically transparent film, regional models having a plurality of layer structures are established, the waveforms of the

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reflected light from said regional models are calculated, and the thickness of said optically transparent film is determined by fitting, using said calculated waveform information and the spectral waveform information of the detected reflected light;

wherein, in the step of determining the thickness of said optically transparent film, a regional model is established which takes into account a region where the reflected light from said pattern and the reflected light from the layer beneath said pattern are mixed, the waveform of the reflected light from the regional model thus established is calculated, and the thickness of the optically transparent film covering said pattern is determined using the waveform information thus calculated and the spectral waveform information of said detected reflected light.

wherein, in the step of measuring said film thickness, measurement points are determined using spectral data from said detected reflected light;

wherein said film thickness calculating means establishes a regional model comprising a plurality of layer structures calculates the waveform of the reflected light from said regional model, and determines the thickness of said optically transparent film by fitting, using the waveform information thus calculated and the spectral waveform information of the detected reflected light.

7. Claims 39 and 54 are rejected under 35 U.S.C. 102(b) as being anticipated by Tan et al (US 4,909,631).

Tan et al show a method for thin film thickness and refractive index determination comprising:

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irradiating light onto a sample on which a plurality of layers of films are formed and having a surface overlaid by an optically transparent thin film;

detecting light reflected from the sample in response to irradiation of the sample; and

determining the thickness of the optically transparent thin film using spectral waveform data from the detected reflected light and wherein the thickness of the optically transparent thin film is determined using waveform information calculated by using models having a plurality of layer structures.

8. Claim 60 is rejected under 35 U.S.C. 102(b) as being anticipated by Ebbing et al (4,953,982).

Ebbing et al show a method and apparatus for endpoint detection in a semiconductor wafer etching system comprising:

irradiating light (Figure 2a) onto a pattern on an integrated circuit on a wafer having an n optically transparent thin film;

detecting light reflected by the pattern;

using spectral waveform data (2 frequencies) of the reflected light, determining plural measurement points for measuring the film thickness; and

measuring the film thickness at the measurement points, by successively irradiating light onto the measurement points.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 37, 38, 43, 47, 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeishi in view of Gaston et al (4,293,224).

Takeishi shows a polishing process and endpoint detection monitoring method comprising:

irradiating light (6, 29, 38) onto a sample on which a pattern (61) is formed and which is covered with a thin film;

using an optical system, detecting (9, 12, 20, 22, 23...) light reflected from the sample in response to irradiating the sample; and

calculating the thickness of the film using spectral waveform information from the detected reflected light;

wherein in the step of calculating, data regarding surface area ratio of the pattern and surface area reflectivity of the pattern are both used (column 19, last paragraph).

Takeishi does not expressly show that the layer is a transparent layer. Gaston et al (Gaston hereinafter) show the measurement of transparent film by use of white light. At the time of the invention, one of ordinary skill in the art would have been motivated to use Takeishi to measure the thickness of a transparent layer with white light since Gaston shows the motivation to measure transparent films, in particular an etching process.

As for claim 49, Takeishi shows that a halogen lamp may be used thus having a waveband of 400-800nm (column 6, lines 42+).

As for claims 38 and 43, Takeishi does not expressly say that the patterns have a width of the pattern is 1 μ or smaller but the size of such pattern are notoriously well known in the art to be 1 μ or smaller since measurements are often made in Angstroms.

Response to Arguments

Applicant's arguments with respect to claim 37-64 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Hwa S. Lee whose telephone number is 571-272-2419. The examiner can normally be reached on Tue-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley Jr. can be reached on 571-272-2800 ext 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Andrew Hwa S. Lee
Primary Examiner
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